DataGeneral

Technical Manual

FIELD SERVICE MAINTENANCE PROCEDURES

(Preliminary Release)

6045 6050 6051 DISC DRIVES

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(Preliminary Release)

6045 6050 6051 DISC DRIVES

PREFACE

This manual contains key preliminary maintenance procedures for DGC 6045 and 6050 cartridge disc drives. The reader is directed to the technical manual (DGC no 015-000056) for additional information.

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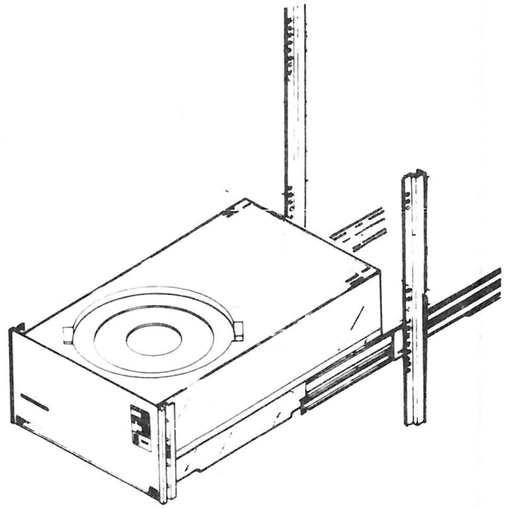
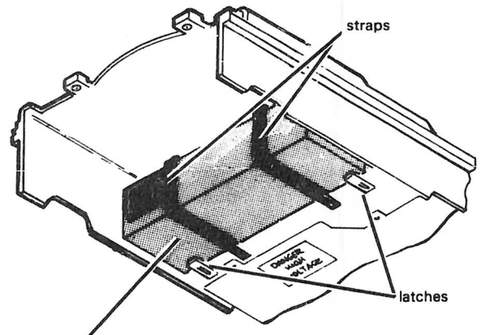
Filter replacement

Preliminary field service procedure

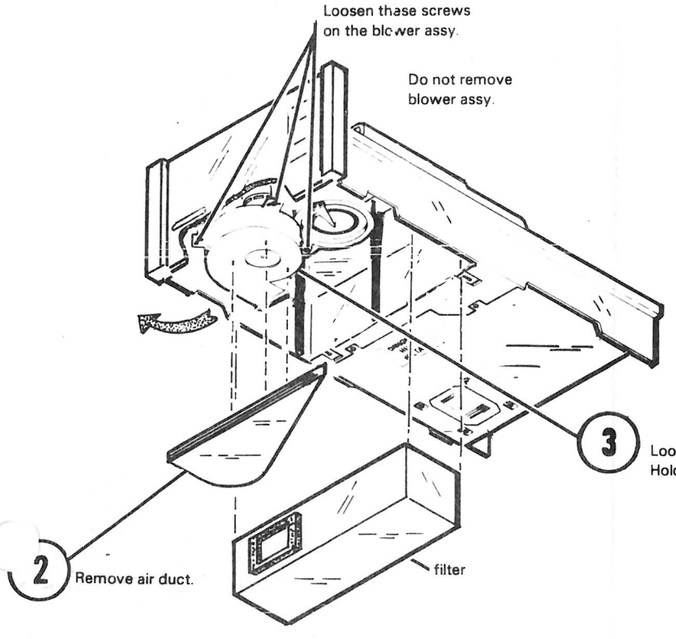
Replace filter every 1000hrs or 6 months, whichever comes first.



1 Extend drive fully out.



4 Unhook rubber straps and loosen and slide back latches. Drop filter out and replace with new filter.



2 Remove air duct.

3 Loosen and rotate the blower assy away from the filter. Hold and tighten in this position.

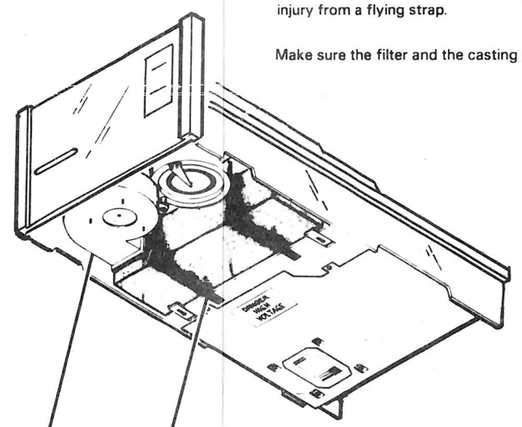
DG-03201

CAUTION:

If the new filter is not in all the way the latches will not secure over the filter.

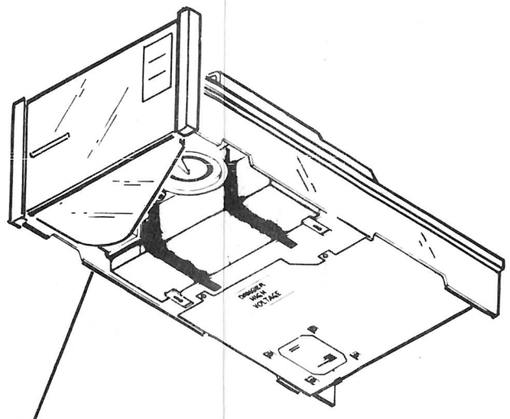
Keep face clear when securing rubber straps Work from the side of the drive to prevent any injury from a flying strap.

Make sure the filter and the casting are clean



5 Rehook the rubber straps and slide the two latches over the filter and tighten.

6 Rotate the blower motor back into position applying some pressure so that the motor and the filter fit snugly. Hold and tighten snugly in this position.



7 Reinstall, slide forward, hold and tighten snugly the air duct.

NOTE: Make sure the duct is clean before installing.

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Engineering data sheets: **DISC SUBSYSTEM**

Models 6045, 6050, 6051

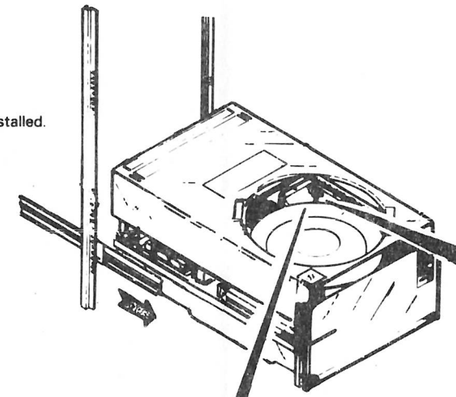
Brush replacement

Preliminary field service procedure

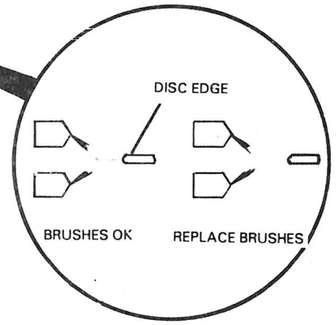
1 Extend the drive fully out.
Remove the disc pack if one is installed.

Remove the top cover.

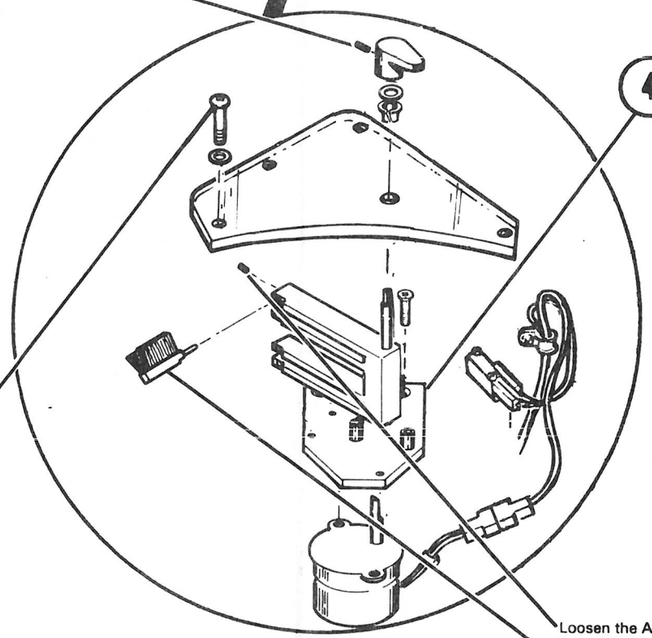
Inspect brushes for wear
(see sketch at right)



WHEN BRUSHES NEED REPLACEMENT



2 Loosen the Allen screw and remove the outside brush arm.



3 Remove the four screws holding the transparent brush cover.

4 Loosen the two Allen screws holding the base plate.
Remove the brush assy from the brush chamber.

5 Loosen the Allen screw holding the brush.

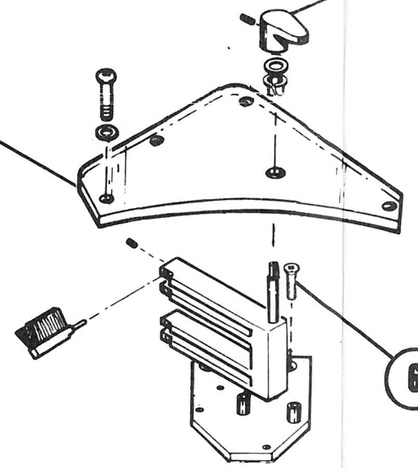
Remove the brush and replace with a new brush.

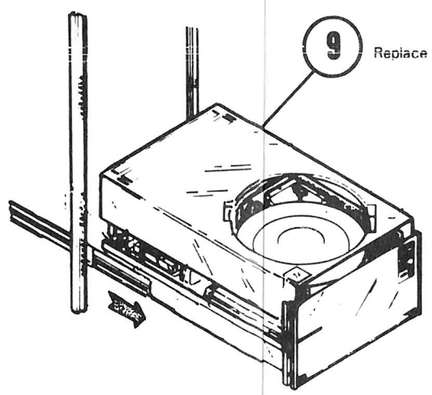
NOTE:
When installing the new brush be sure that the brush fits snugly against the brush arm.
Hold and tighten the brush in place.

6 Install the brush assy into the brush chamber.
Tighten in place usng the two Allen screws.

7 Replace the transparent cover over the brush chamber.
Tighten using the four screws.

8 Replace the outside brush arm.
Tighten the Allen screw to hold it in place.





9 Replace the top cover of the drive.

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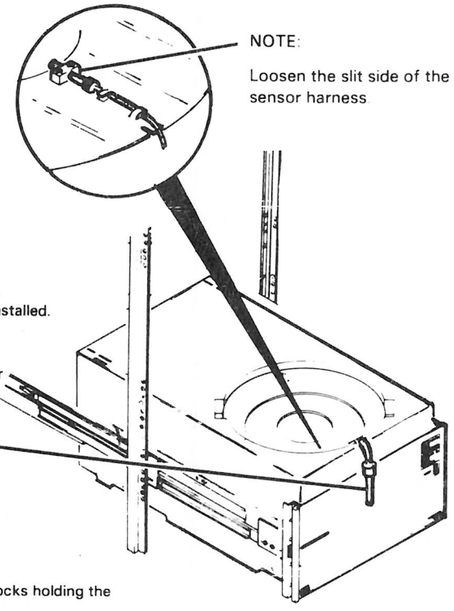
Fixed disc replacement

Preliminary field service procedure



NOTE:

Loosen the slit side of the sensor harness

1 Extend drive to the load position.
Remove cartridge disc if one is installed.

2 Loosen and unfasten pack sensor from the baffle plate.
Tape sensor over the top front of the drive.

3 Remove the 4 white mounting blocks holding the baffle plate.

NOTE:

This block is smaller than the others, note its location in the disc chamber, it must go back in the same location.

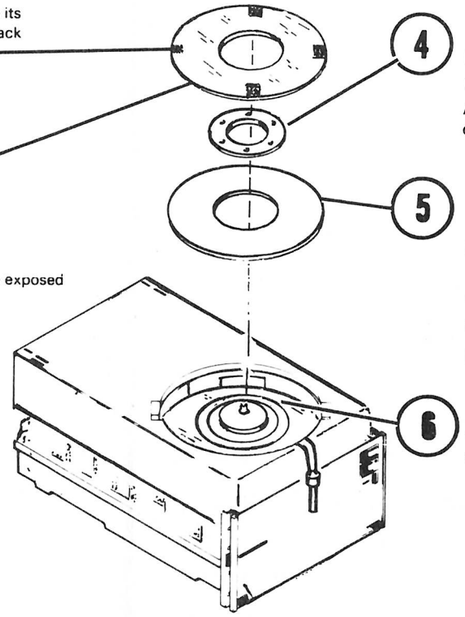
CAUTION:

Work carefully around the spindle hub to prevent damaging it.

Remove the baffle plate.

CAUTION:

Wear white gloves when working with the exposed disc.



4 Remove the ring clamp.

CAUTION:

Any foreign material or objects that touch the disc could damage it.

5 Remove the disc.

NOTE:

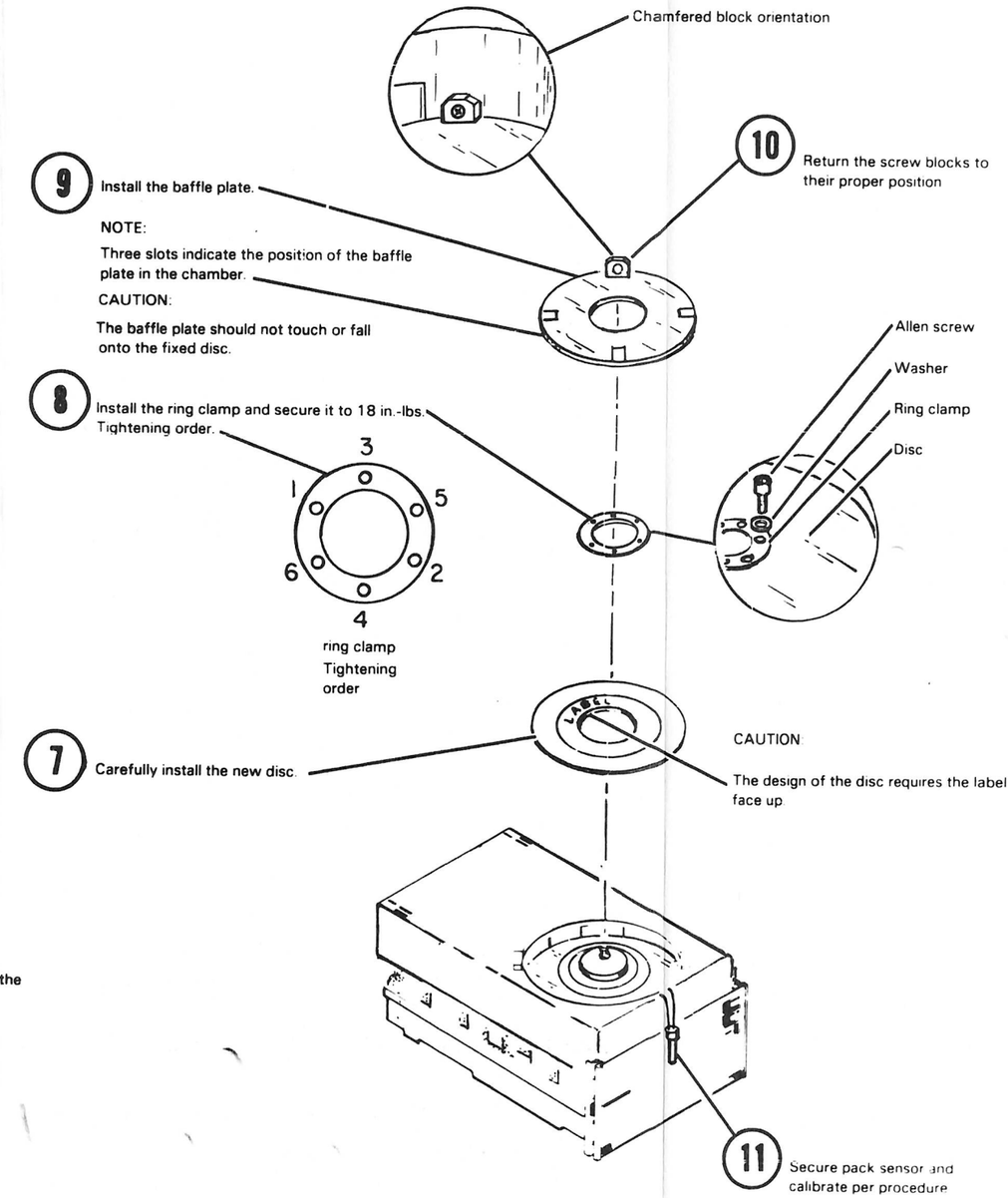
Removal of the fixed disc or heads disrupts all data and formatting on the fixed disc.

CAUTION:

Nothing must touch or scratch the disc surface.

6 Carefully examine the disc chamber, heads, and the spindle hub for any foreign matter.

DG-03202



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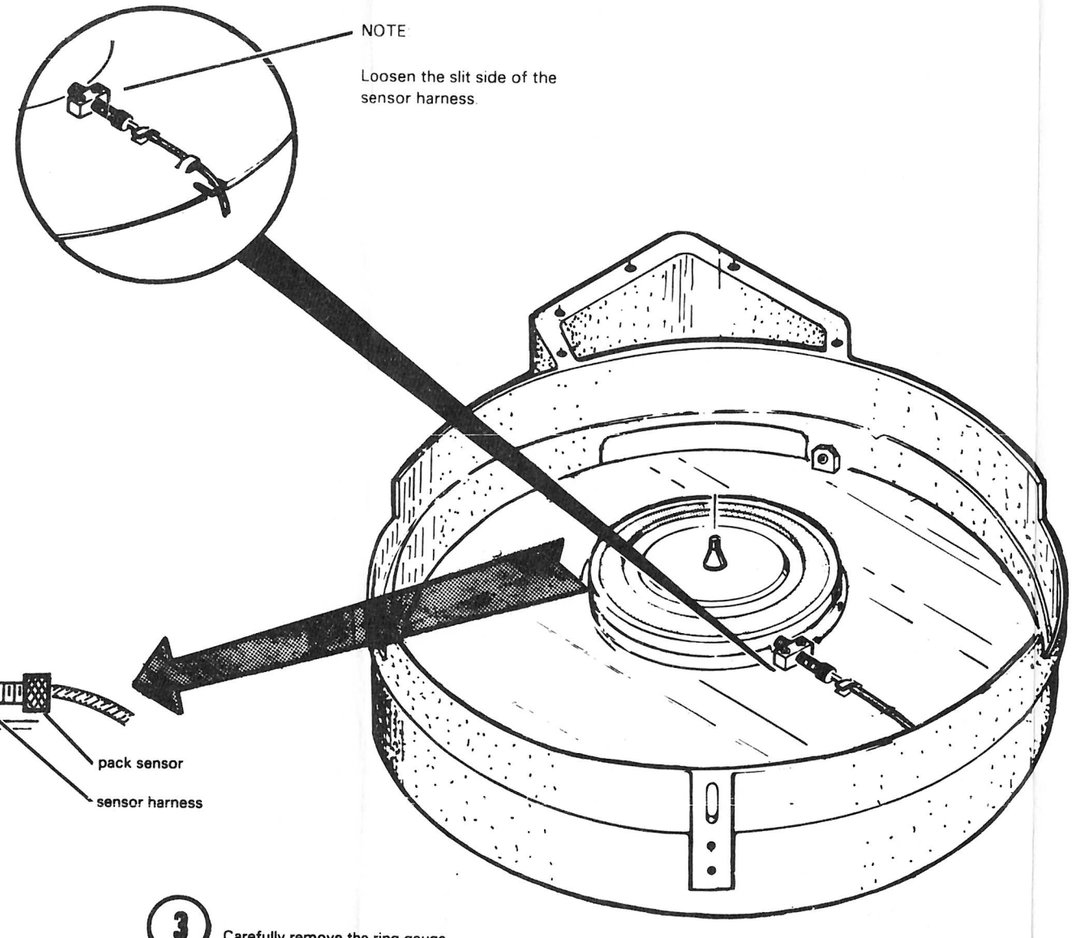
Pack sensor alignment

Preliminary field service procedure



1 Place the ring gauge 117-436 onto the spindle hub.

NOTE:

Loosen and slide back the sensor to avoid contact with the ring gauge.

2 Using a feeler gauge adjust the sensor to .025 + .005, - .001 in. from the ring gauge. Hold and tighten the sensor in this position.

NOTE: Recheck the gap after tightening.

3 Carefully remove the ring gauge.

4 Proceed to the (Upper) Head Alignment procedure.

NOTE:

The data burst vs index specification must be checked if the pack sensor is aligned.

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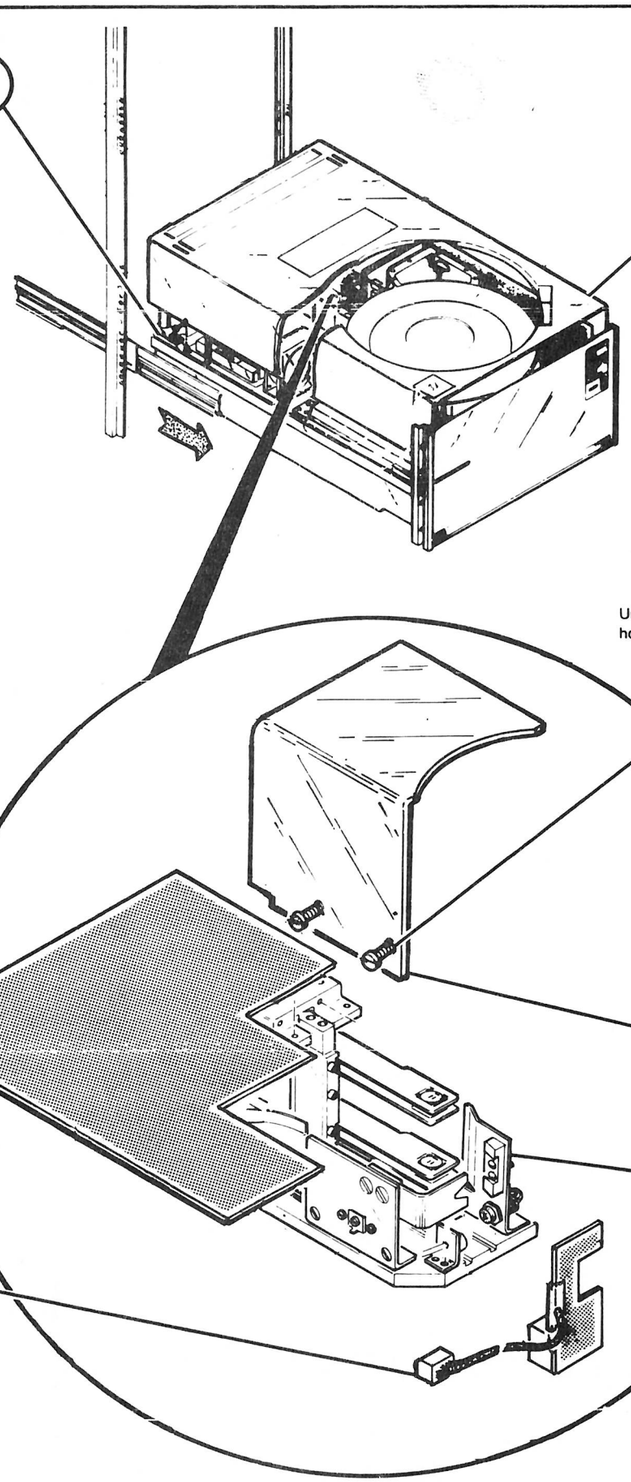
Head cleaning

Preliminary field service procedure

Extend the drive fully out.
Remove the disc pack if one is installed. **1**

Remove the top cover. **2**



Unscrew the two screws holding the shield. **4**

Unplug the thermistor cable from the servo board. **3**

Lift and rotate (cw) the transparent shield out of the drive. **5**

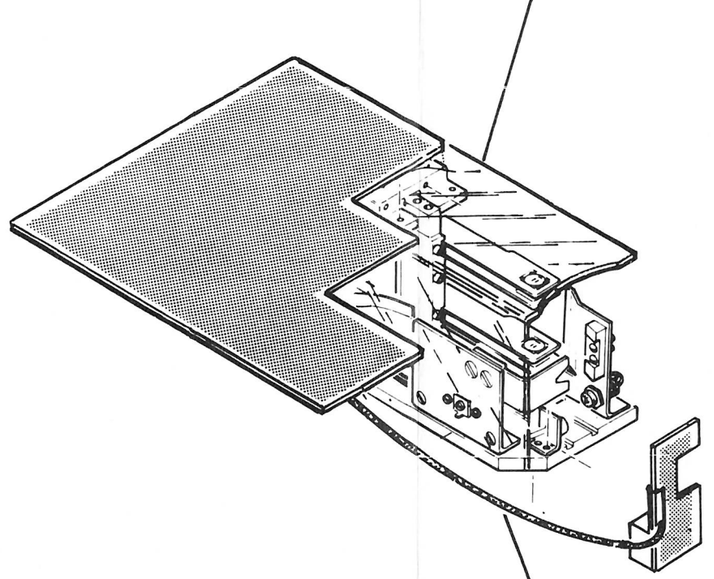
Clean the heads using isopropyl alcohol. Use a clean cotton-tipped swab soaked in alcohol for cleaning and a clean cotton-tipped swab to remove the alcohol residue. **6**

Approach the upper heads from the disc cavity area. Approach the lower head from the side. Use a small dental mirror to inspect them.

Damage to the disc surface can occur if the heads move away from the fully retracted position.

DG-03204

Replace and secure shield. **7**



Reconnect the thermistor cable. **8**

Replace the top cover of the drive **9**

CAUTION:

No finger prints or lint should be left on the heads.

NOTE:

Damage to the disk surface will occur if the heads move out of the detent position.

The LOAD light will go out if the heads move away from the fully retracted position.

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READ/WRITE HEADS

The following paragraphs define the types of contamination and head-to-disc interference that may adversely affect read/write heads.

During normal read/write operations the disc surfaces may become slightly scratched. This type of scratch would look similar to a "polishing" scratch and is insignificant as long as data can be properly recovered. However, there are types head-to-disc interference that can cause significant damage to the disc pack and the read/write heads. Dirt and dust particles, oxide, and residue buildups on either the disc pack or the read/write heads, are some of the most common types of head-to-disc interference.

Dirt and dust particle damage occurs when a foreign particle becomes wedged between the "flying" read/write head and the spinning disc. The particle may become embedded in the disc surface or in the ceramic of the read/write head and is likely to leave a deep groove at the point of entry. If the particle remains embedded in the read/write head it will damage the disc and destroy not only that particular track but that entire disc surface. If the particle is not detected during preventive maintenance procedures the particle may eventually become dislodged and become wedged between another head and the disc pack.

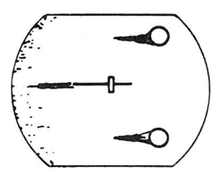
Oxide buildup may occur on the disc pack or the read/write heads. Oxide can be picked up by the read/write heads of dirty disc packs. When the accumulation of oxide exceeds a given point on the read/write heads it begins to rub on the disc surface accumulating more oxide. The result of the oxide accumulation is a useless read/write head and a damaged disc pack.

Residue buildup may also occur on the disc pack or the read/write heads. Residue buildup is usually the result of contaminants introduced onto the disc pack or read/write heads. These contaminants are usually alcohol residue left after cleaning either the disc pack or the read/write heads, fingerprints which contain oils and salts, or a contaminated environmental atmosphere such as smoke. The results of residue buildup, if not detected, are the same as particle and oxide buildup, a useless head or heads, and a damaged disc pack.

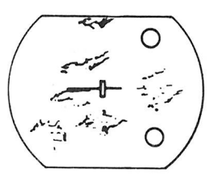
An early indication of these types of head-to-disc interference are an excessive number of intermittent read errors. Therefore, the importance of prevetive maintenance cannot be overemphasized.

During the preventive maintenance procedures the read/write heads should be inspected for the following conditions:

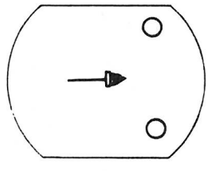
- Scratches and grooves
- Oxide buildup
- Residue buildup
- Fingerprints and other oil-like stains.



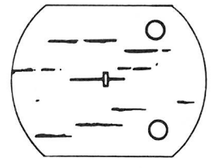
Slight oxide buildup. Head should be cleaned and used.



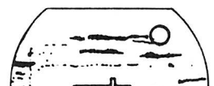
Alcohol residue. Head must be cleaned.



Oxide buildup in pole piece. Head must be replaced.



Slight scratches. No oxide buildup. Head is usable.



Oxide buildup due to scratches. Head must be replaced.

Crashed (usually burned) Head must be replaced.

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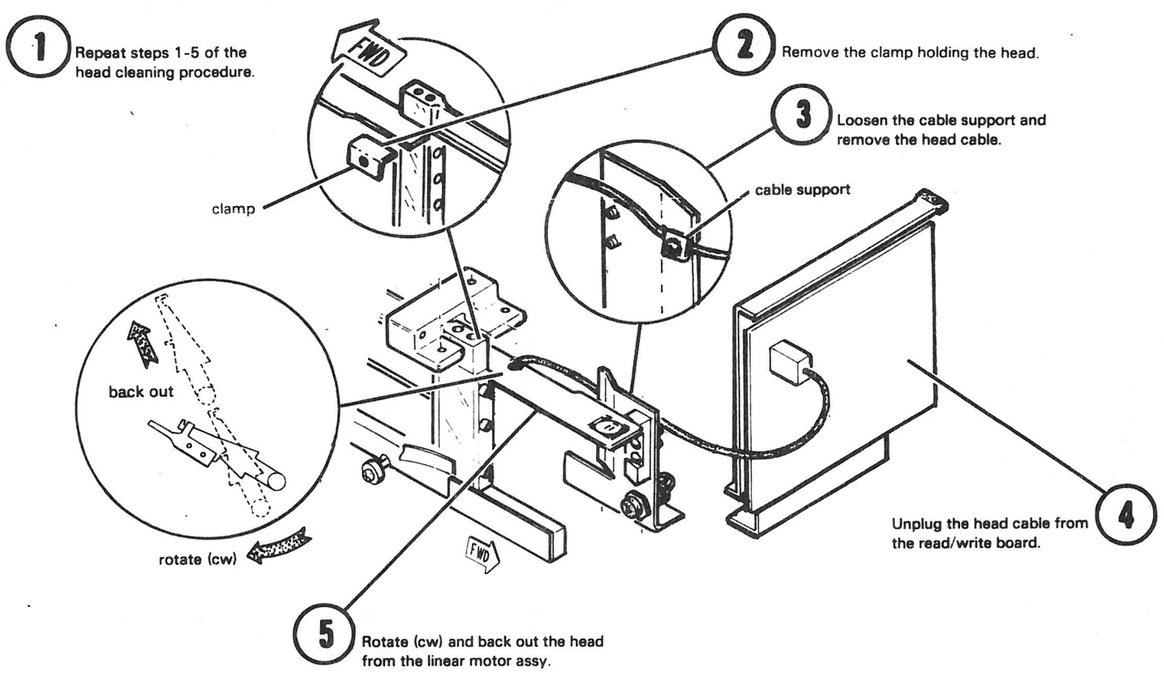
Head replacement

Preliminary field service procedure



1 Repeat steps 1-5 of the head cleaning procedure.

2 Remove the clamp holding the head.

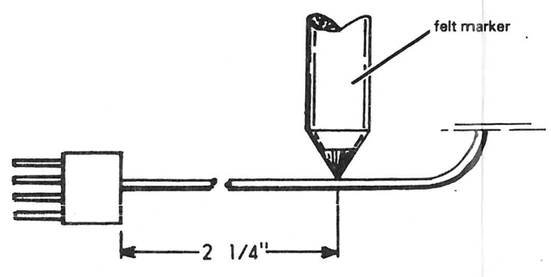
3 Loosen the cable support and remove the head cable.

4 Unplug the head cable from the read/write board.

5 Rotate (cw) and back out the head from the linear motor assy.

CAUTION: Damage to the head will occur if two heads touch.

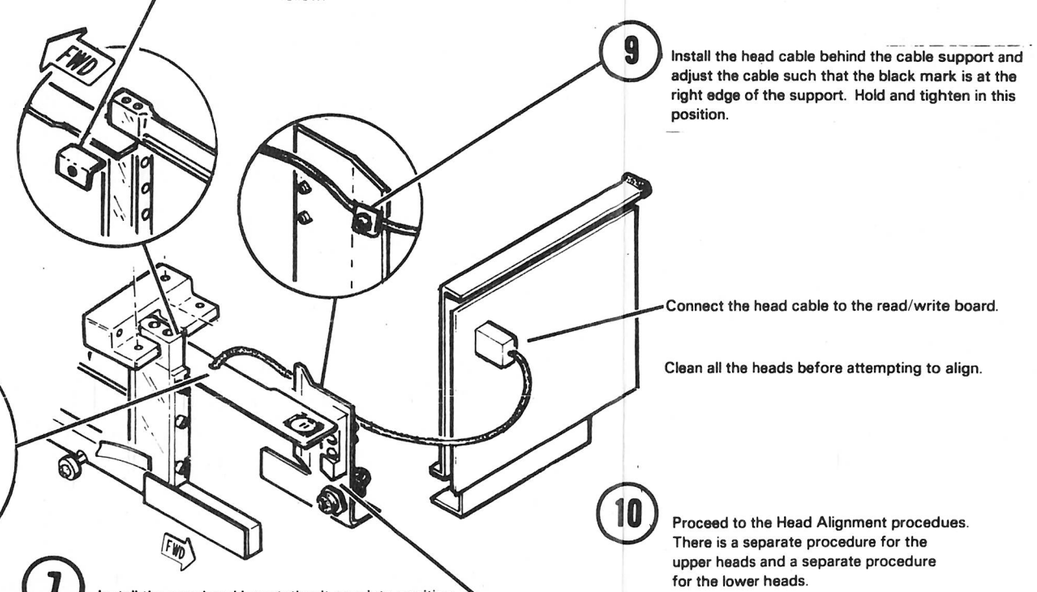
NOTE: Removal of the heads disrupts all data and formatting on the disc.



6 Starting at the read/write board connector, measure 2 1/4 inches along the new head cable. Mark this point with a felt marker.

8 Replace the clamp to hold the head in place.

NOTE: Tighten to finger tight only since the alignment procedure will follow.



9 Install the head cable behind the cable support and adjust the cable such that the black mark is at the right edge of the support. Hold and tighten in this position.

Connect the head cable to the read/write board.

Clean all the heads before attempting to align.

10 Proceed to the Head Alignment procedues. There is a separate procedure for the upper heads and a separate procedure for the lower heads.

7 Install the new head by rotating it ccw into position.

CAUTION: Damage will occur if the new head touches any other head.

CAUTION: Hold the head such that it does not float while securing it against the carriage.

Place the front of the head onto the ramp loader.

NOTE: For the upper heads, the front of the head must be lifted, for the lower heads the front must be lowered.

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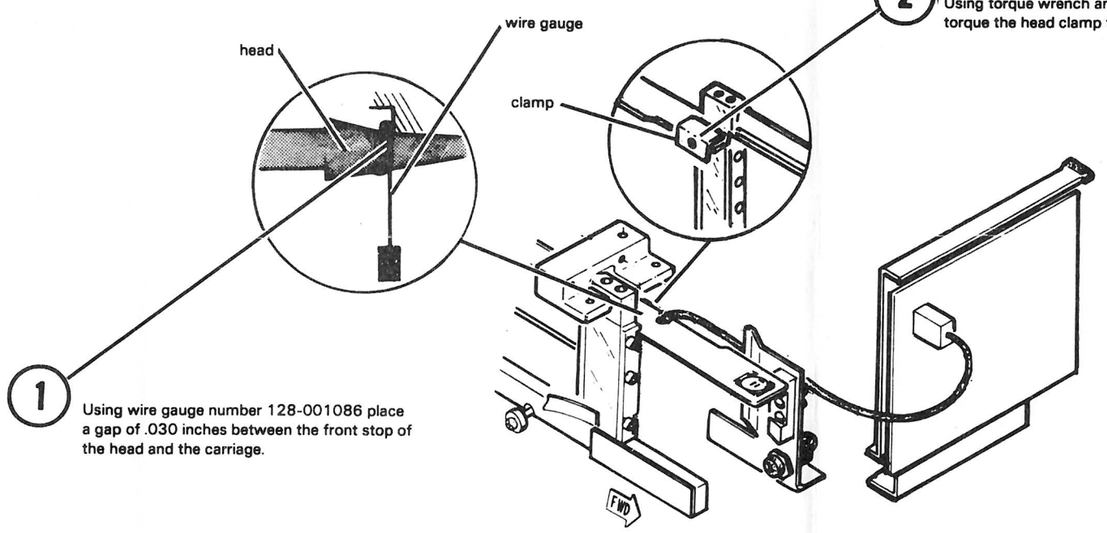
(Lower) Head alignment

Preliminary field service procedure



1 Using wire gauge number 128-001086 place a gap of .030 inches between the front stop of the head and the carriage.

2 Using torque wrench and adapter (number 128-000255) torque the head clamp to 90 in-oz.

3 Repeat steps 7-9 of the Head Cleaning Procedure.

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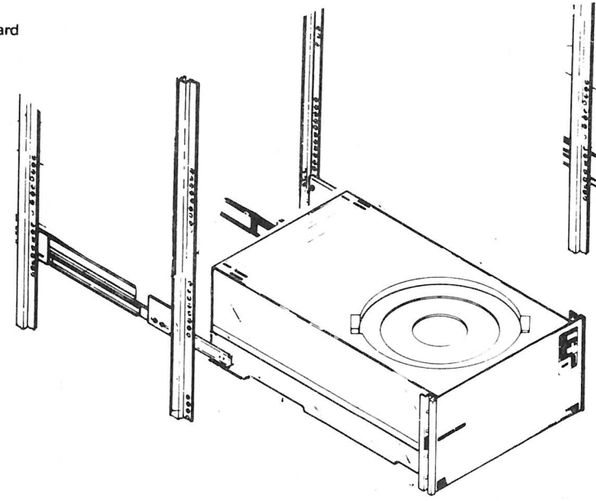
(Upper) Head alignment

Preliminary field service procedure

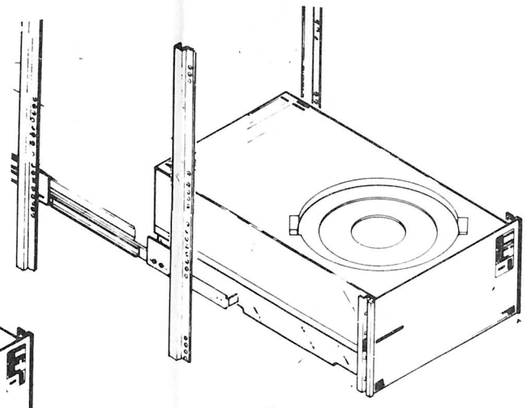
1 Verify correct electrical alignment of the servo board before attempting to align the heads.

IMPORTANT:

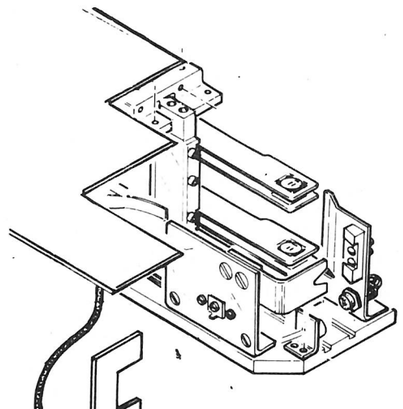
THE DRIVE MUST BE IN THE PACK LOAD POSITION WHEN CHECKING THE ALIGNMENT.



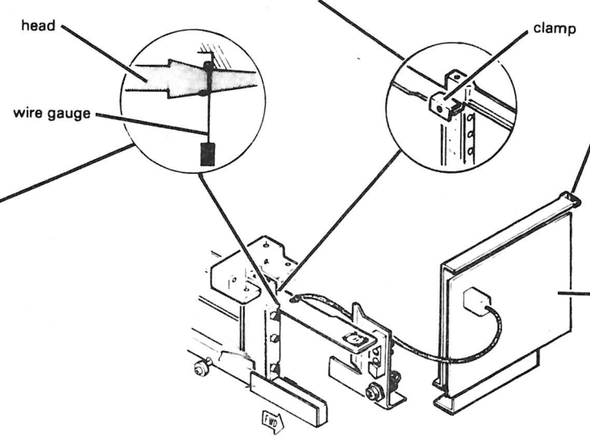
Extend the drive fully out during the setup for the head alignment.



For actual alignment, the drive MUST be in the pack load position.



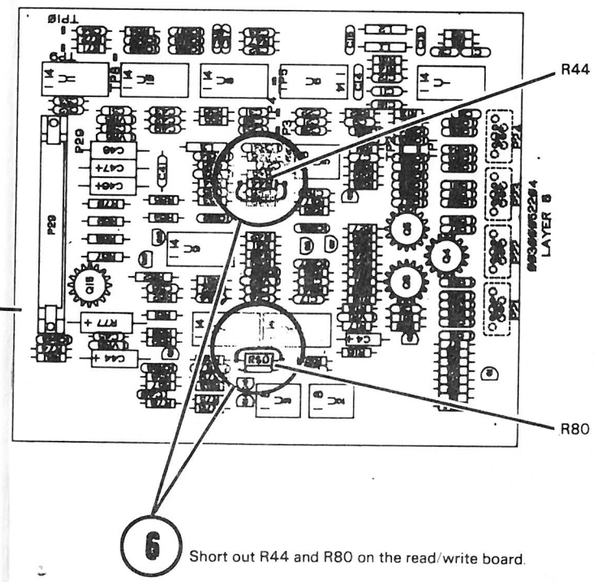
2 Reconnect the thermistor cable.



3 Using wire gauge number 128-001086 place a gap of .030 inches between the front stop of the head and the carriage.

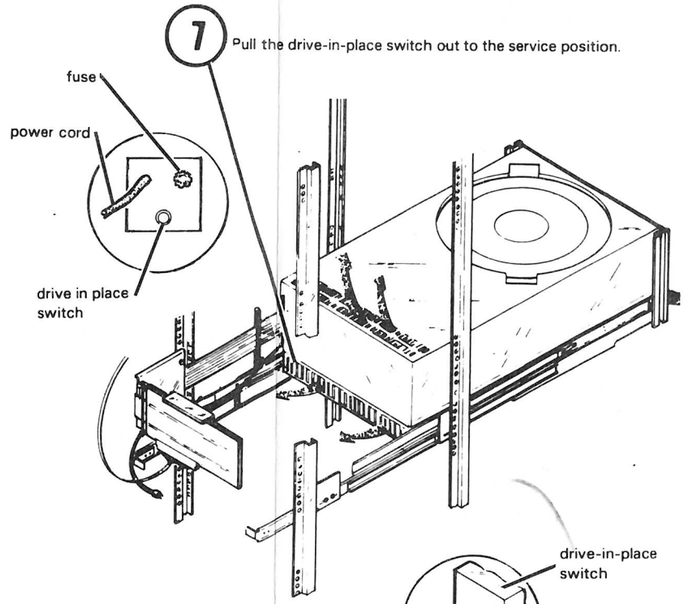
4 Using the torque wrench and adapter (number 128-000255) torque the head clamp to 90 in-oz.

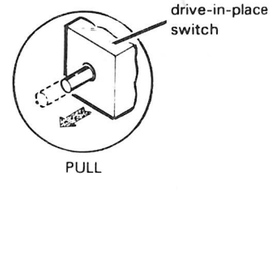
5 Remove the read/write board shield



6 Short out R44 and R80 on the read/write board.

7 Pull the drive-in-place switch out to the service position.





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8 NOTE: If the alignment cartridge is moved from one area to another where the room temperature is different, allow it one full hour to equilibrate at the new temperature before using it to align a drive. After the stabilization period, a cartridge can be freely moved from unit to unit with no additional waiting period.

CAUTION: Cleanliness of the alignment cartridge and the disc spindle are essential.

CAUTION: Do not use a material for cleaning which will tear or leave lint.

CAUTION: An alignment cartridge which shows visible evidence of damage to the armature plate or locating cone (including plating flaking) will cause an erroneous alignment.

Load the cartridge/diskette reliability program.

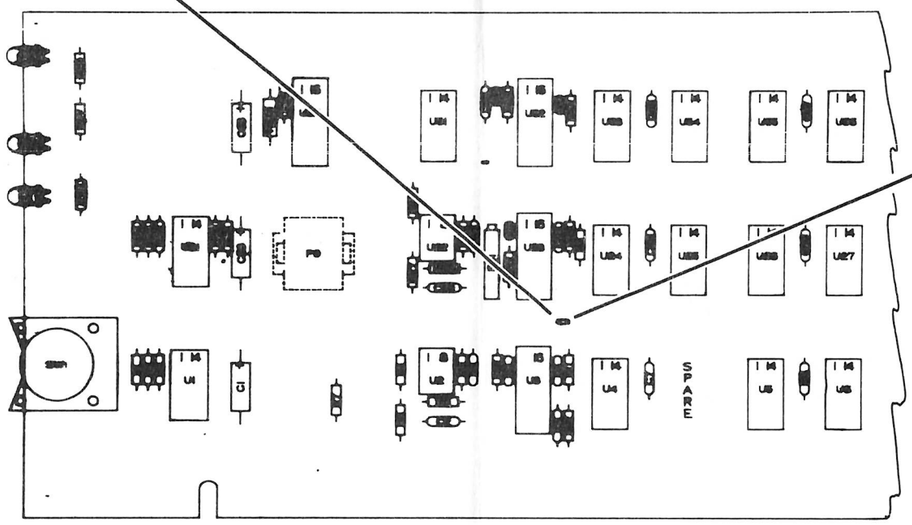
- Load the relaibility tape via the binary loader.
- Set the data switches to start the Command String Interpreter.
- Press Start to execute the reliability program.

9 Install the alignment cartridge number 005-3670.
Run the disc drive for 1/2 hour with the heads loaded.

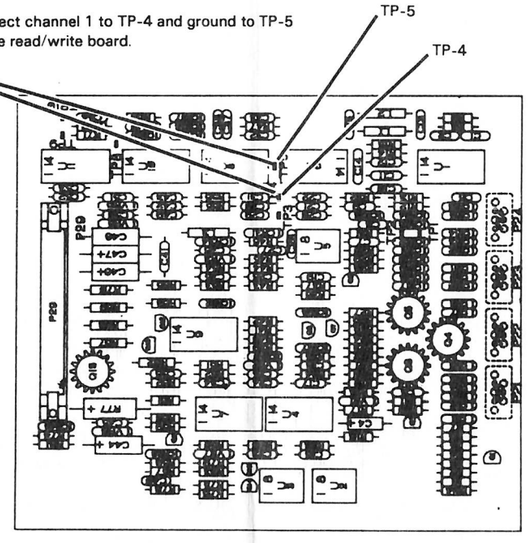
10 SCOPE SETUP

Channel 1	2V/Div	AC
Channel 2	2V/Div	DC
Trigger	Positive	
Sync	Channel 2	
Time Base	2 mS/Div (calibrated sweep)	
Vert Mode	Channel 2	

11 Connect channel 2 to TP-10 on the logic board.



12 Connect channel 1 to TP-4 and ground to TP-5 on the read/write board.



13 Uncalibrate the Time Base so that two index pulses can be seen. Position these two index pulses 10cm apart.

14 Adjust the Scope's vert mode to select channel 1

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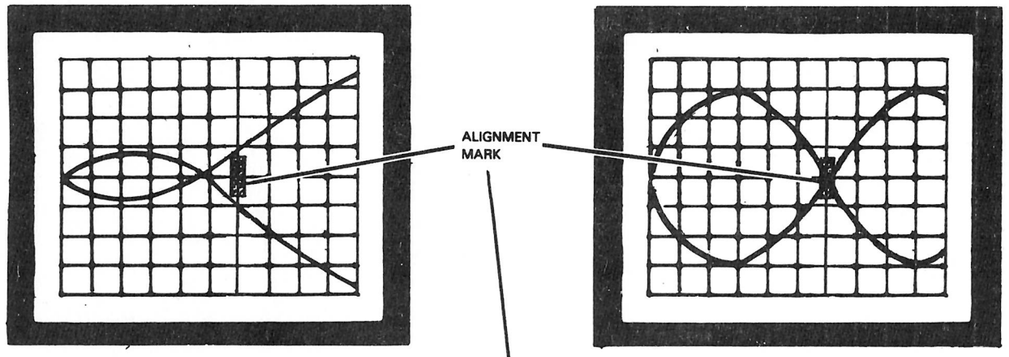
IMPORTANT:

THE DRIVE MUST BE IN THE PACK LOAD POSITION WHEN CHECKING THE ALIGNMENT.

15 Using the Command String Interpreter select Head 0 and seek to 222_8
The scope trace will approximate one of the following waveforms.

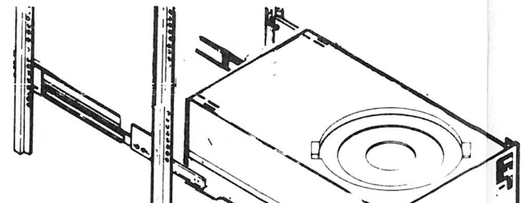


The Head is too far in.

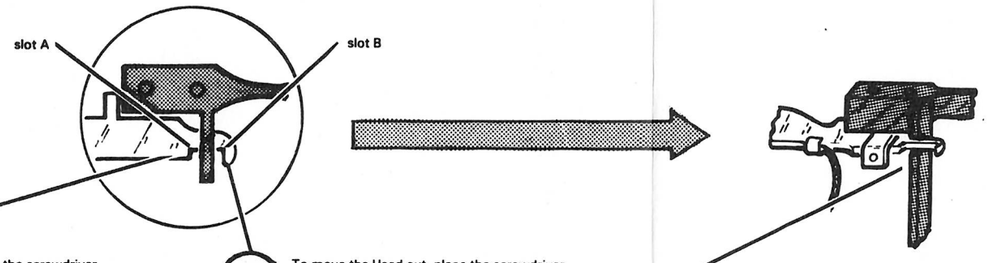
The Head is aligned.

The Head is too far out.

16 If the Head is not aligned, go to step 17 or 18.
When Head 0 is aligned repeat step 15 for Head 1.
When both Heads are aligned go to step 19.



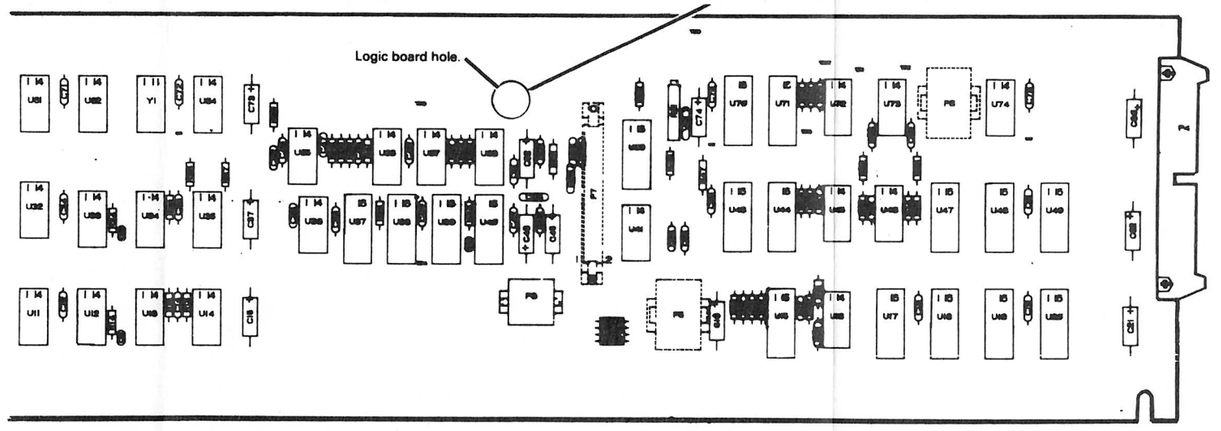
For the actual alignment, the drive MUST be in the pack load position.



17 To move the Head in, place the screwdriver into slot A and rotate cw slowly until the proper waveform is achieved.

18 To move the Head out, place the screwdriver into slot B and rotate ccw slowly until the proper waveform is achieved.

NOTE: These slots are accessible through a hole in the logic board.



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(Upper) Head alignment

Preliminary field service procedure

19 Set the scope controls to the following:

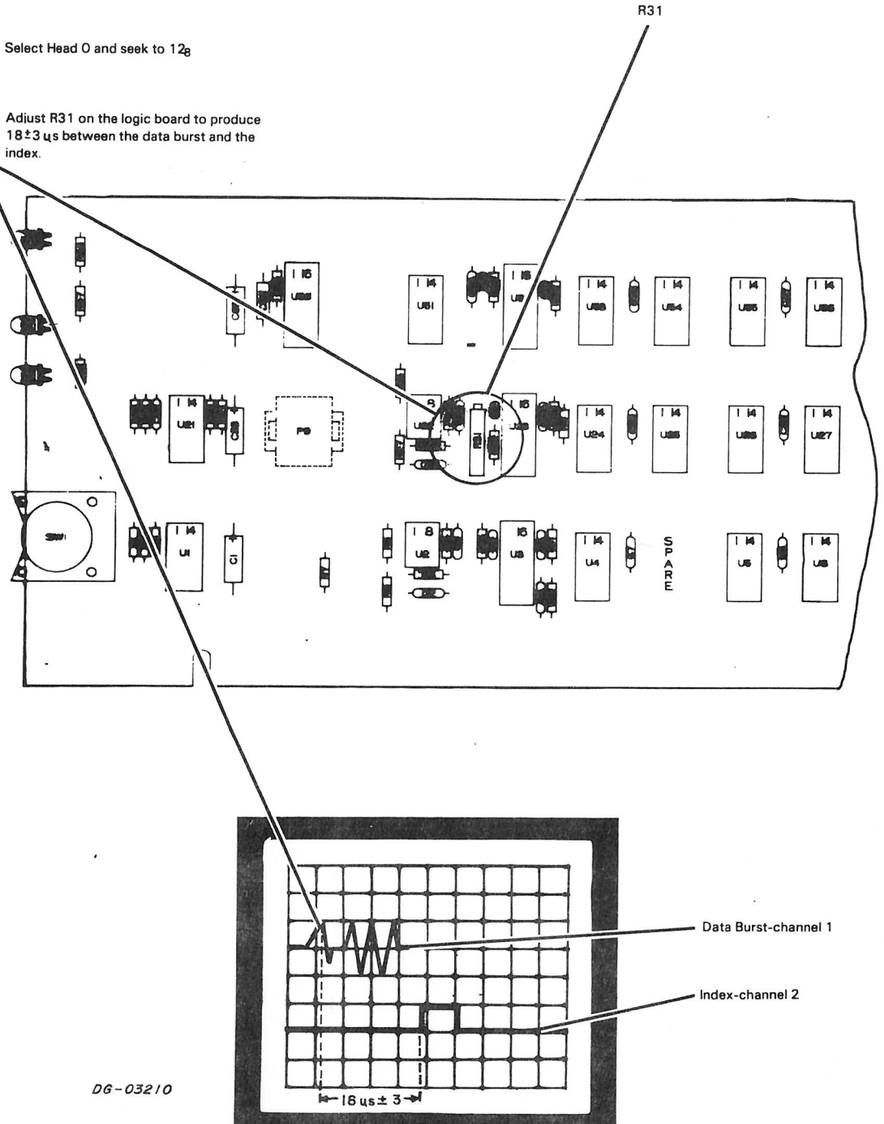
Time base	5 µs/Div
Trigger	Positive.
Sync	Channel 1
Vert mode	Alt

NOTE:

The remainder of the controls are unchanged including the probe placement.

20 Select Head 0 and seek to 12_8

21 Adiust R31 on the logic board to produce 18±3 µs between the data burst and the index.



22 Repeat for Head 1

NOTE:

This procedure may have to be repeated so that both Heads meet alignment specifications.

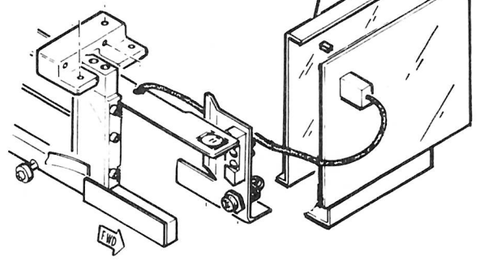
23 Unload the Heads and wait for the load light to turn on.

Wait at least 2 sec after the load light has come on before removing the cartridge.

Remove the Alignment cartridge and power off the drive.

Remove all probes and jumpers used in this procedure.

24 Replace the read/write shield.

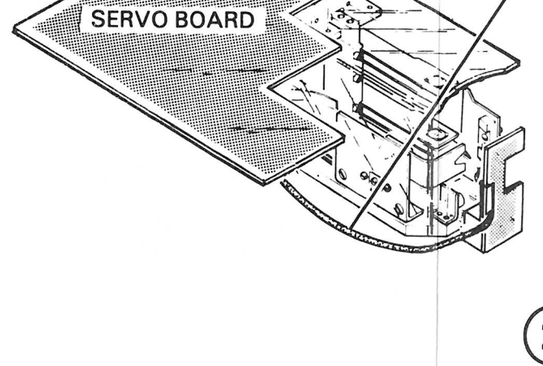


25 Replace and secure shield

NOTE

The thermistor cable will have to be disconnected to install the shield

26 Reconnect the thermistor cable



27 Replace the top cover of the drive.

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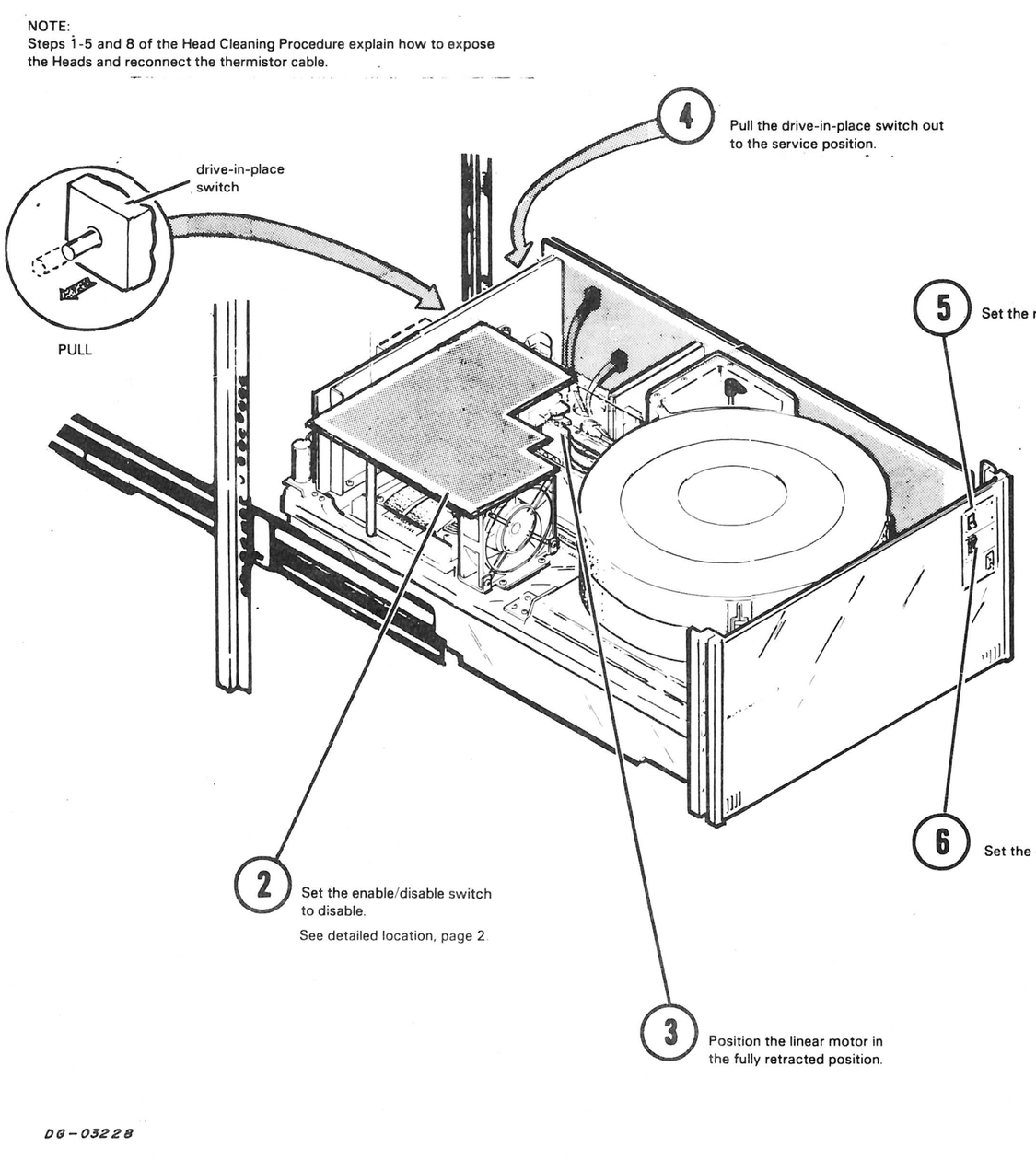
1 Repeat steps 1-5 of the Head Cleaning Procedure.
Repeat step 8 of the Head Cleaning Procedure.

NOTE:
Steps 1-5 and 8 of the Head Cleaning Procedure explain how to expose the Heads and reconnect the thermistor cable.



4 Pull the drive-in-place switch out to the service position.

5 Set the run/load switch to load.

6 Set the on/off switch to on.

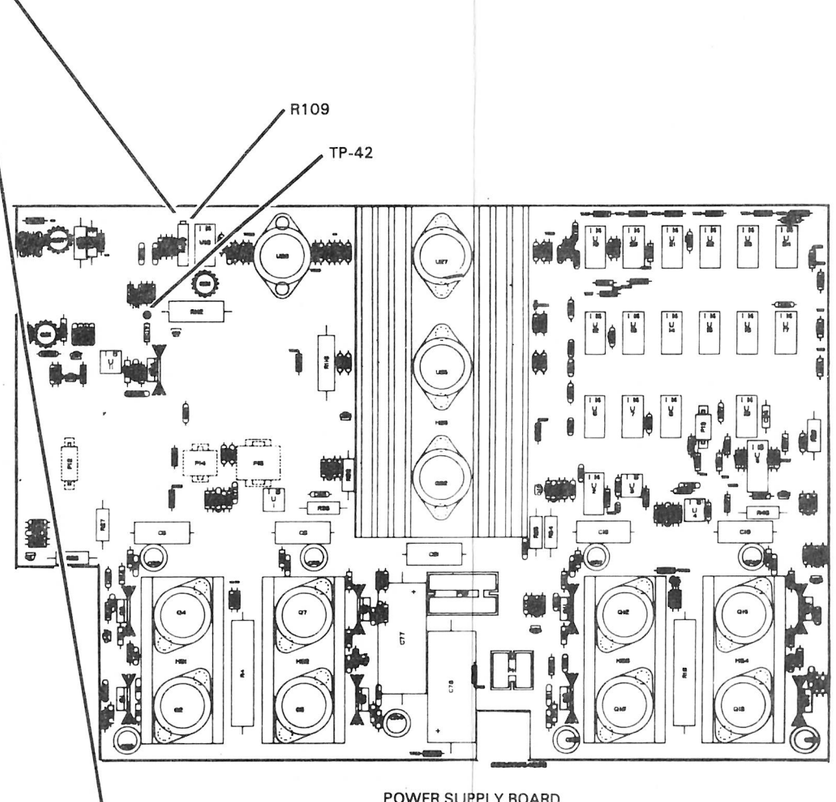
2 Set the enable/disable switch to disable.

See detailed location, page 2.

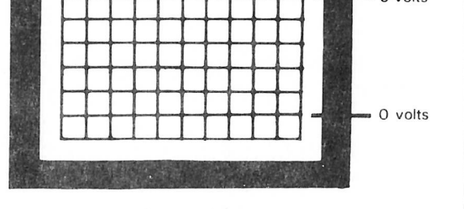
3 Position the linear motor in the fully retracted position.

DG-03228

7 Connect the scope to TP-42 and adjust R109 for 5 ± .1 volts dc on the power supply board.



POWER SUPPLY BOARD



Free-running

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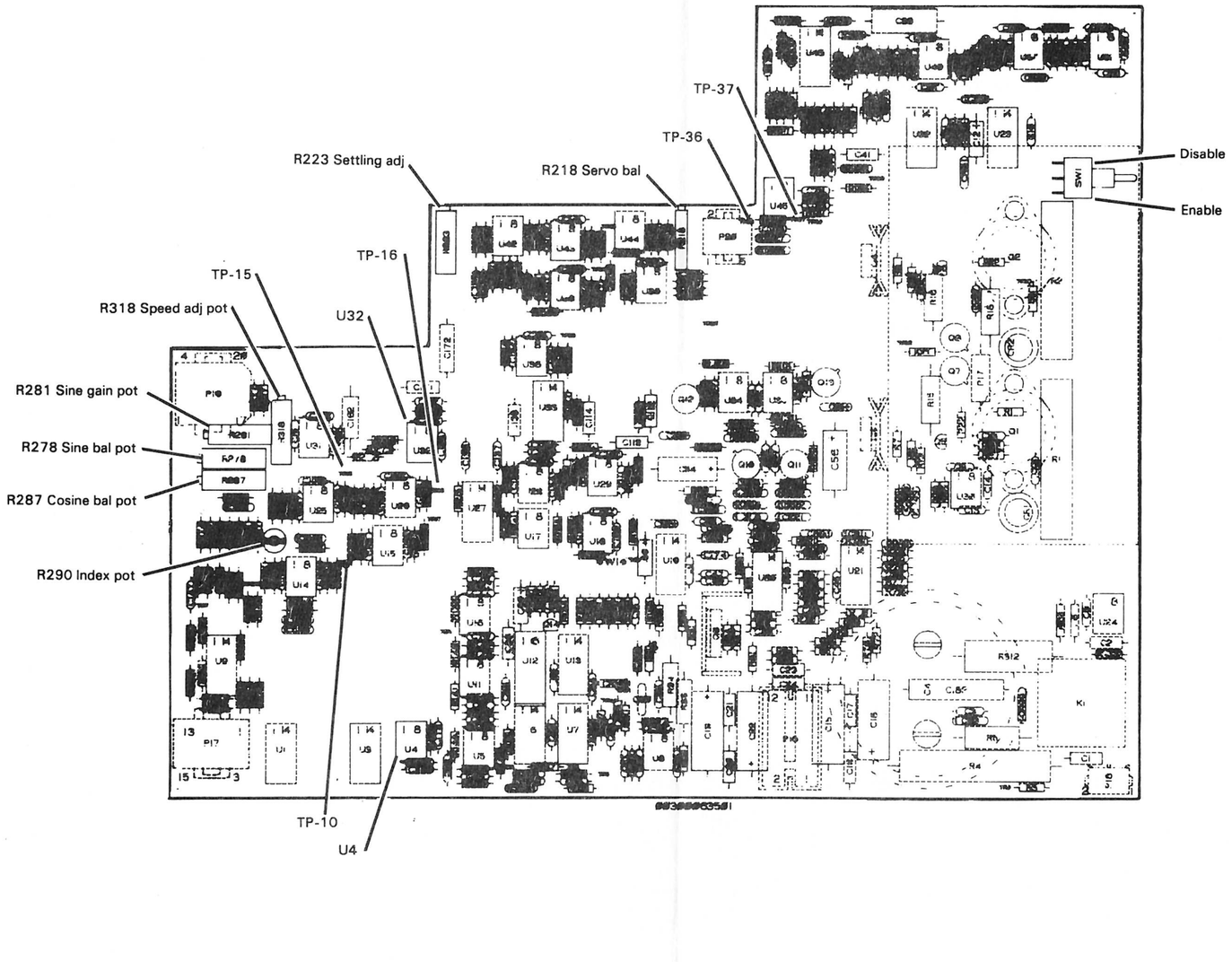
ALL POT ADJ AND TEST POINTS REFER TO THE SERVO BOARD UNLESS OTHERWISE SPECIFIED.

SERVO BOARD



DG – 03229

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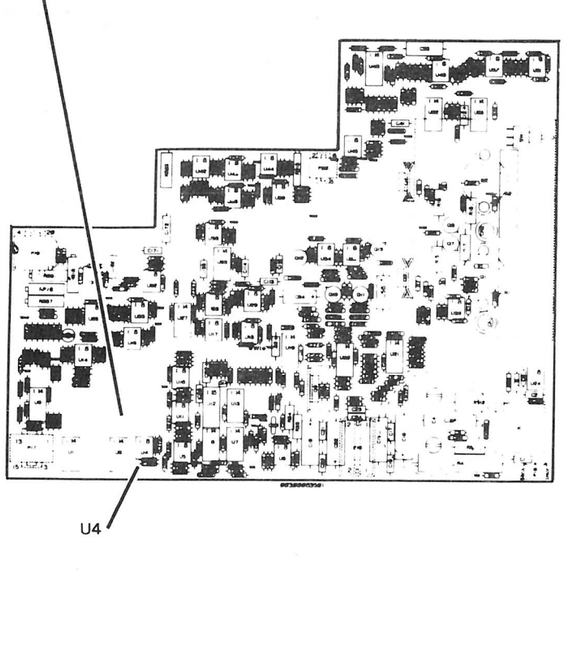
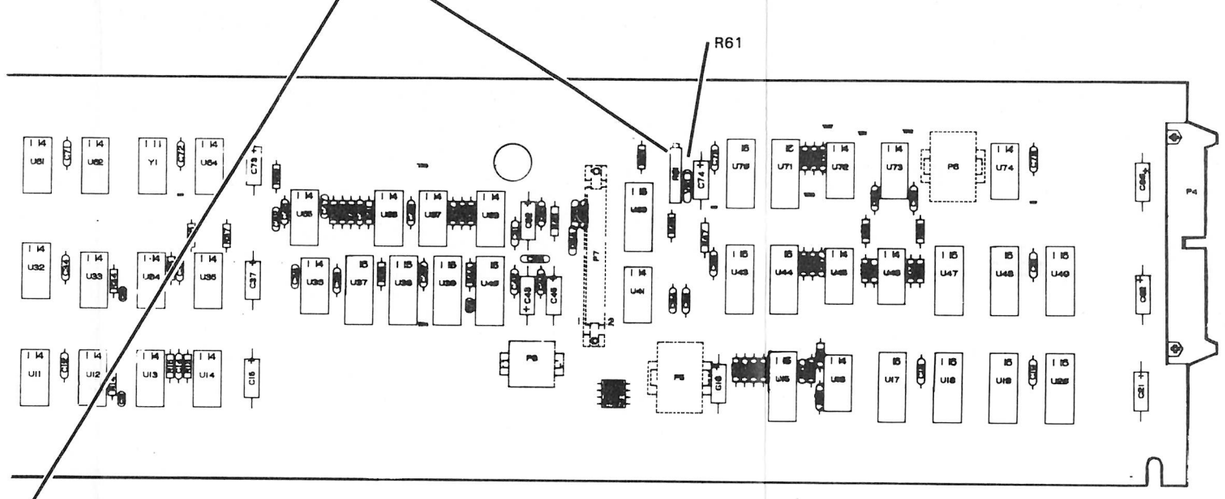
A Set the scope to auto trigger and .05 volts/div and observe the output of U4 at pin 6. See detailed location, page 2.

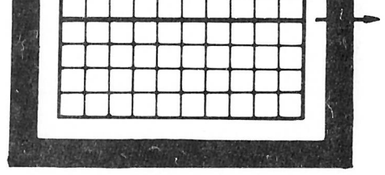


B VELOCITY COMMAND OFFSET

B Adjust R61 on the logic board for 0 ± .02 volts dc.



LOGIC BOARD



.05 volts/div

0 volts

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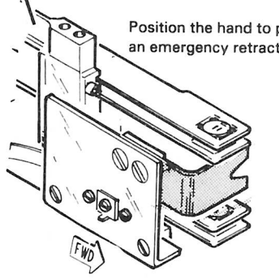
A Install a disc pack, switch the load/run switch to run and wait for the brushes to move onto the disc then back into position again.

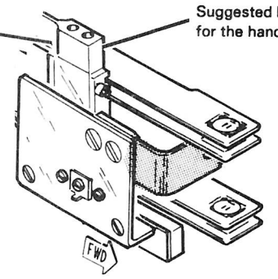
B Move the actuator forward,by hand, smoothly to load the heads.

CAUTION:

Position the hand to prevent injuries in the event of an emergency retract.



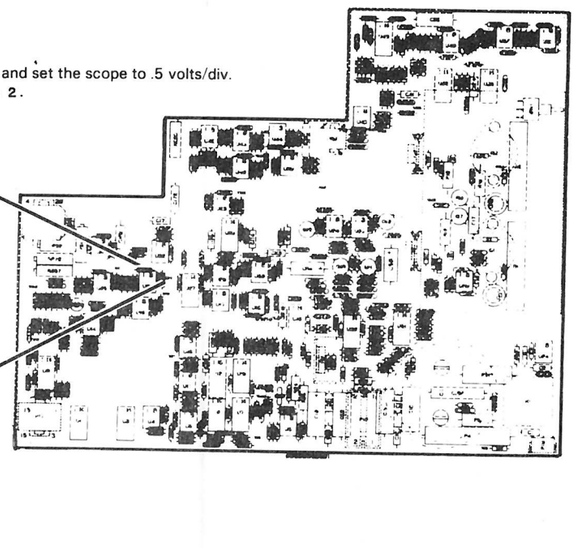
Fully Retracted



Heads Loaded

9 SINE SIGNAL GAIN AND DC BALANCE

C Connect a probe to TP-16 and set the scope to .5 volts/div.
See detailed location, page 2.



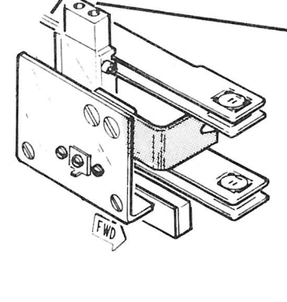
D Generate a waveform by moving the actuator back and forth by hand.

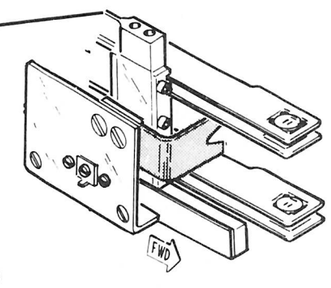
CAUTION:

Position the hand to prevent injuries in the event of an emergency retract.

NOTE:

The actuator will have to move approximately 1/4 inch from the point where the heads are first loaded before a waveform will appear.
Vary the speed of the actuator until a usable waveform is obtained.

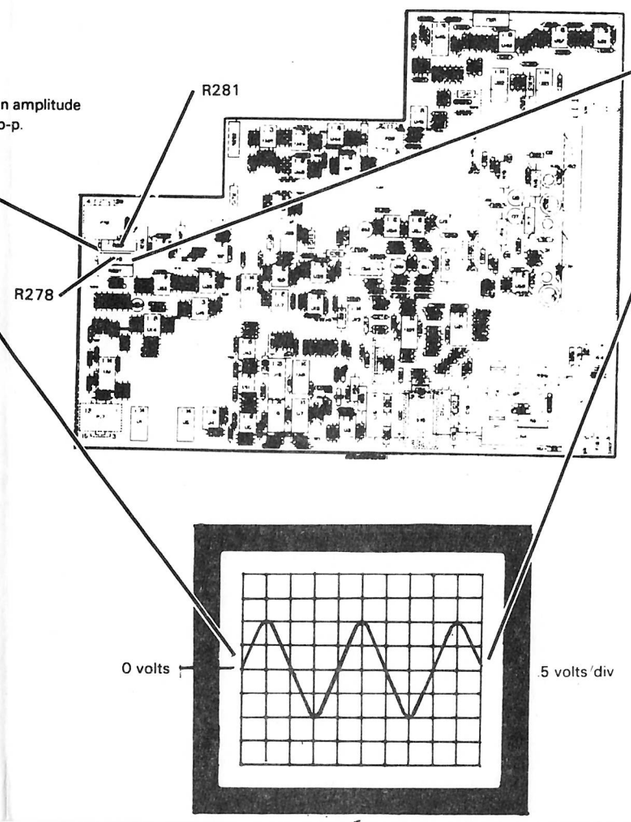




See detailed location, page 2

E Adjust R281 for an amplitude of 2.0 ± .2 volts p-p.

F Adust R278 for a symmetrical waveform about 0 ±.1 volts.



NOTE:

Both steps E and F must meet the specification simultaneously.
Repeat if necessary.

DG-03231

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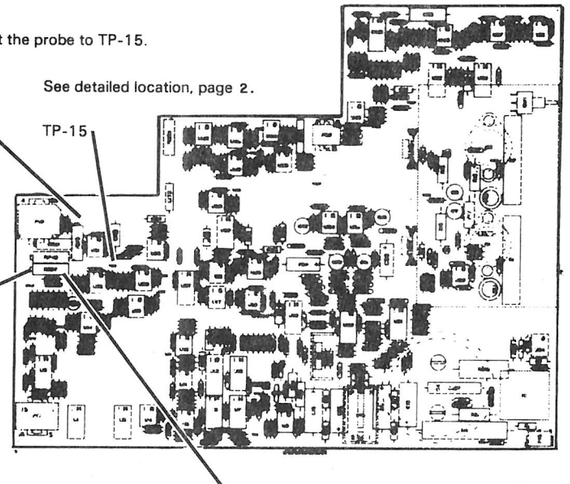
10 COSINE SIGNAL DC BALANCE

A Connect the probe to TP-15.

See detailed location, page 2.



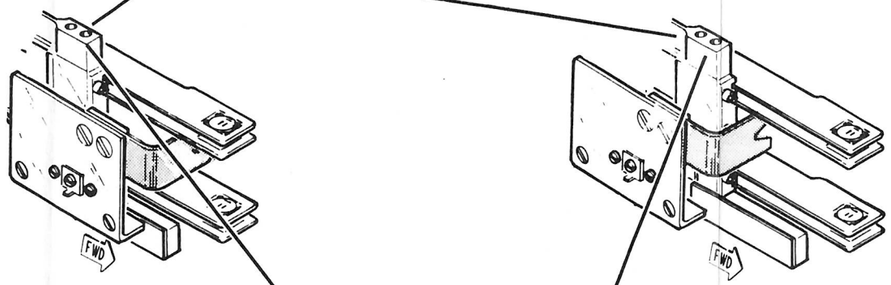
B Generate a waveform by moving the actuator back and forth by hand.

CAUTION: Position the hand to prevent injuries in the event of an emergency retract.

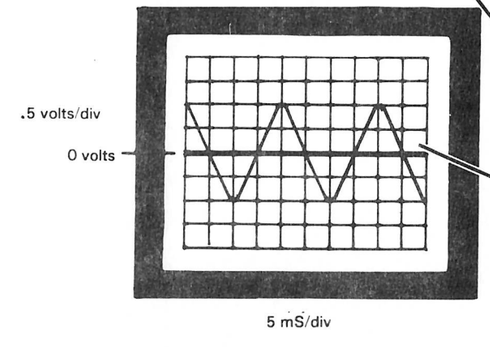
NOTE: The actuator will have to move approximately 1/4 inch from the point where the heads are first loaded before a waveform will appear.

Vary the speed of the actuator until a usable waveform is obtained.

NOTE: The amplitude of the cosine waveform must be between 1.0 and 3.1 volts p-p.



Suggested location for the hand.



C Adjust R287 for a symmetrical waveform about 0 ± .1 volts.

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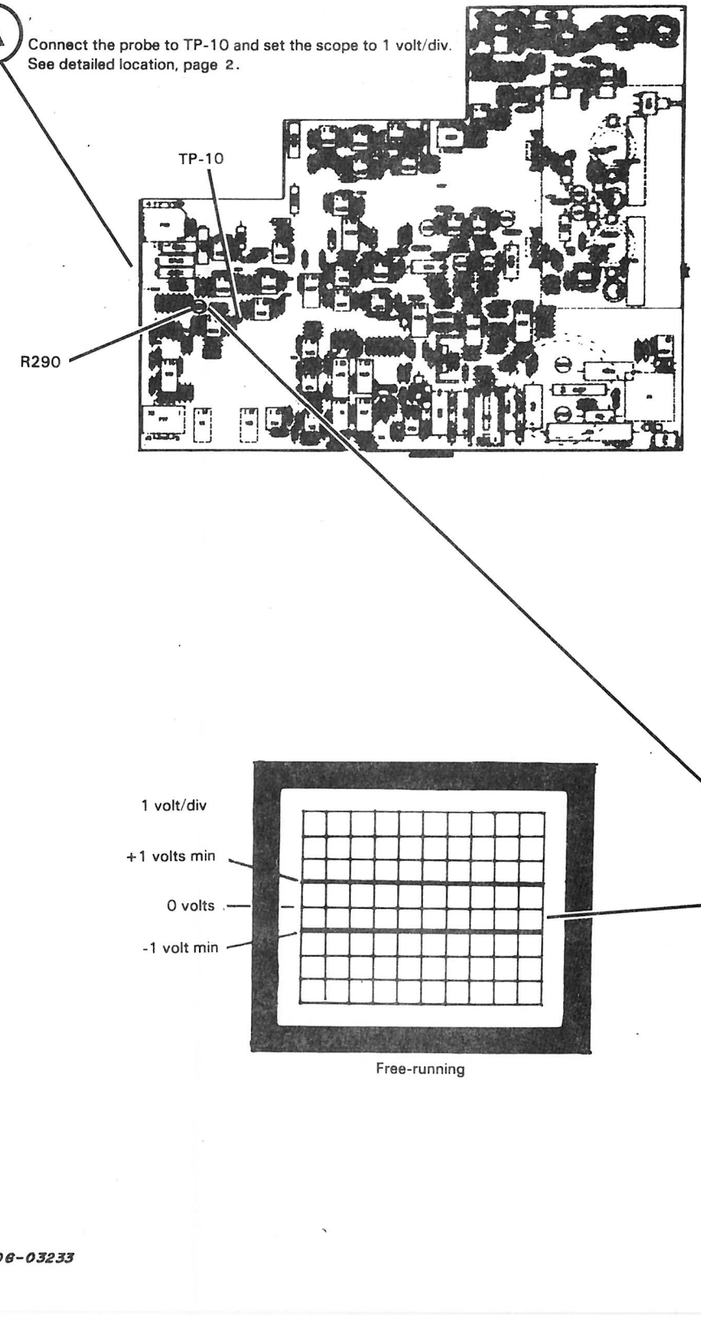
(11) INDEX BALANCE

(A) Connect the probe to TP-10 and set the scope to 1 volt/div.
See detailed location, page 2.

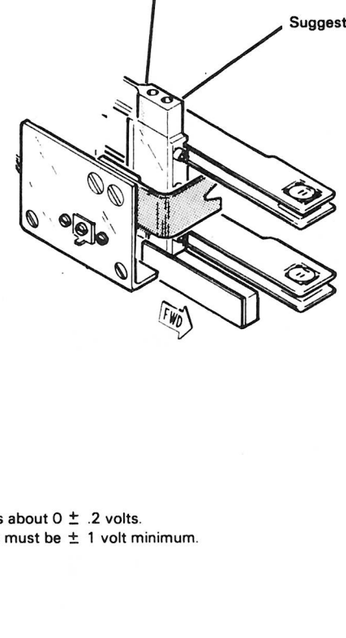


Free-running

(B) Move the actuator by hand back and forth against the front stop.

NOTE: Forward motion will produce a + output.
Backward motion will produce a - output.

CAUTION: Position the hand to prevent injuries in the event of an emergency retract.



(C) Adjust R290 for symmetrical dc levels about 0 ± .2 volts.
NOTE: The amplitude of the dc levels must be ± 1 volt minimum.

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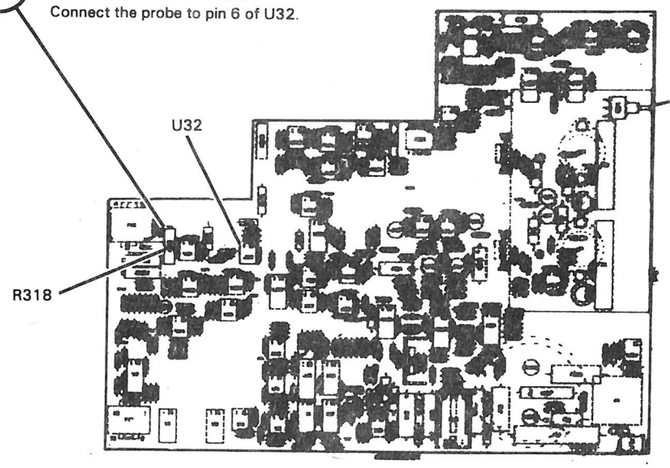
(12) SPEED ADJUSTMENT

(A) ADJUST R318 FULLY CCW.
Connect the probe to pin 6 of U32.



(C) Set the enable/disable switch to enable.

NOTE: Heads will detent to track 0.

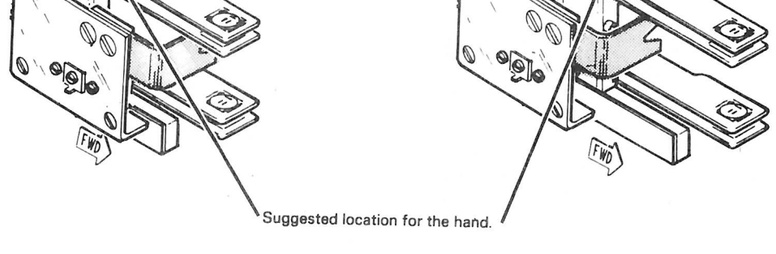
See detailed location, page 2.

(B) Move the actuator by hand back and forth.

NOTE: Forward motion will produce a negative output.

CAUTION: Do not move the heads out of the load position when moving the heads back and forth.

CAUTION: Position the hand to prevent injuries in the event of an emergency retract.



D6-03234

(D) Load the cartridge/diskette reliability program.

Load the relaibility tape via the binary loader.

Set the data switches to start the Command String Interpreter.

Press Start to execute the reliability program.

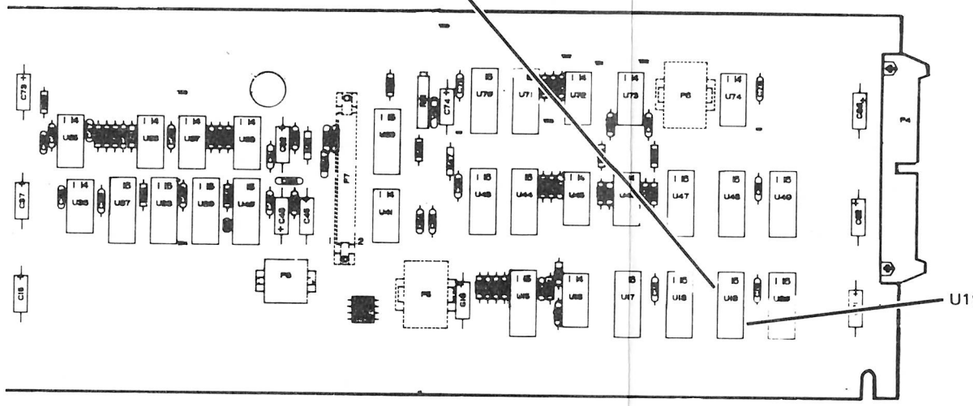
(E) RELIABILITY: COMMAND STRING INTERPRETER

COMMAND STRING: SEE 0 SEE 577 LOO

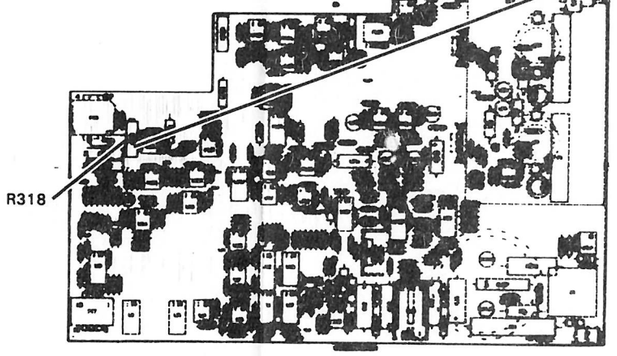
(F) Connect the probe to pin 3 of U19 on the logic board.

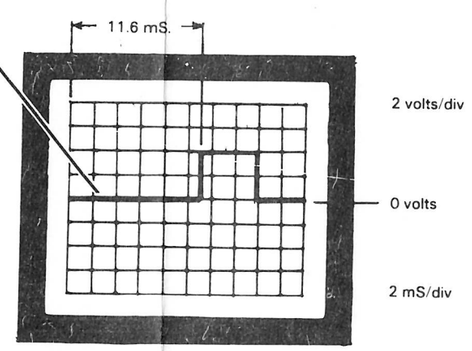
Scope Setup

Gain	2 volts/div
Time base	2 mS/div
Trigger	negative



(G) Adjust R318 for a 0 logic signal for 11.6 ± .2 mS.





See detailed location, page 2

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(13) SERVO BALANCE

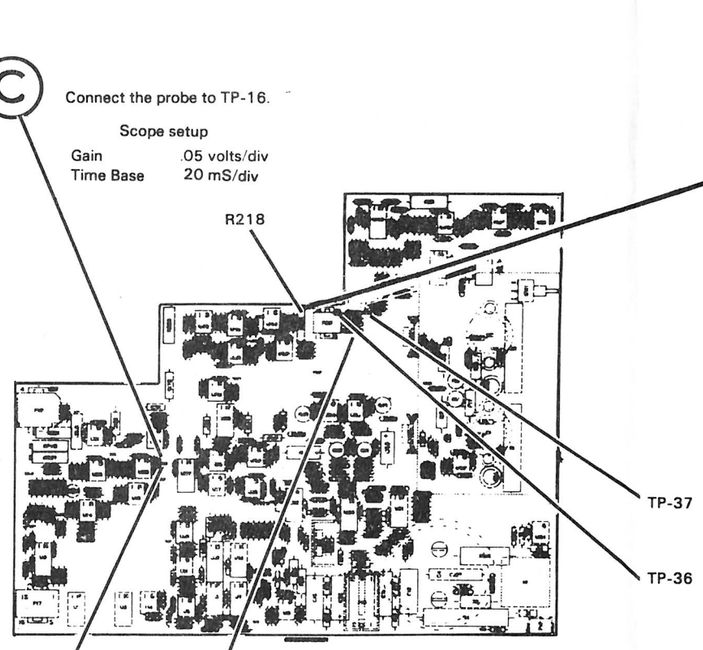
(A) RELIABILITY: COMMAND STRING INTERPRETER

COMMAND STRING: **REC**

(C) Connect the probe to TP-16.

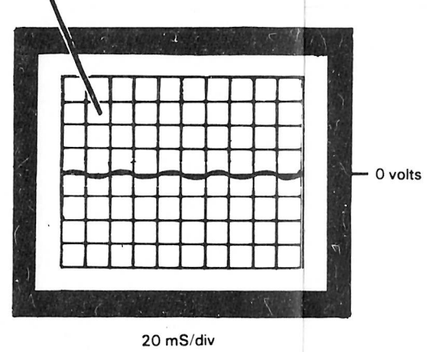
Scope setup

Gain	.05 volts/div
Time Base	20 mS/div



See detailed location, page 2.

(D) Adjust R218 for a symmetrical waveform about 0 ± .01 volts.



20 mS/div

(B) Connect a jumper between TP-36 and TP-37.

D6-03235

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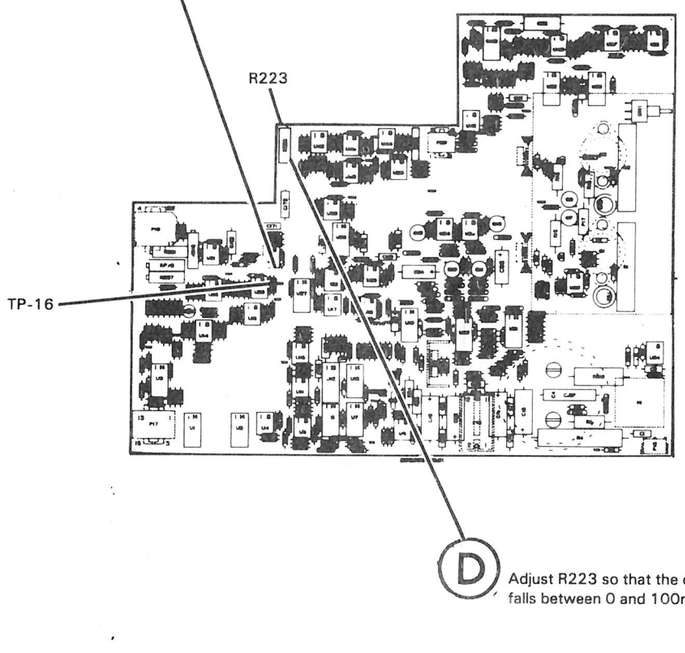
(14) SETTLING ADJUSTMENT

NOTE:
The Speed adjustment and the Servo Balance must be performed prior to this operation.

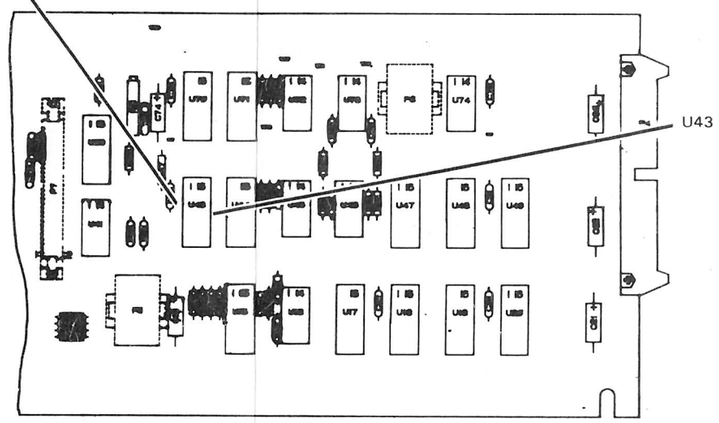
(A) RELIABILITY: COMMAND STRING INTERPRETER

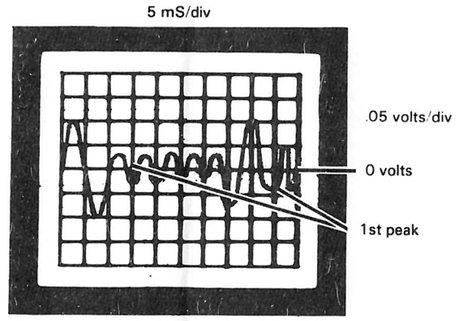
COMMAND STRING: SEE 1 DEL 30 SEE 0 DEL 30 LOO

(B) Connect channel 1 of the scope to TP-16.
See detailed location, page 2.



(C) Connect channel 2 of the scope to U43 pin 9 on the logic board.





(D) Adjust R223 so that the overshoot of the 1st peak in both directions falls between 0 and 100mV.

Scope Setup

Channel 1	05 volts/div
Channel 2	2 volts/div
Time Base	5 mS/div
Trigger	negative channel 2

D6-03236

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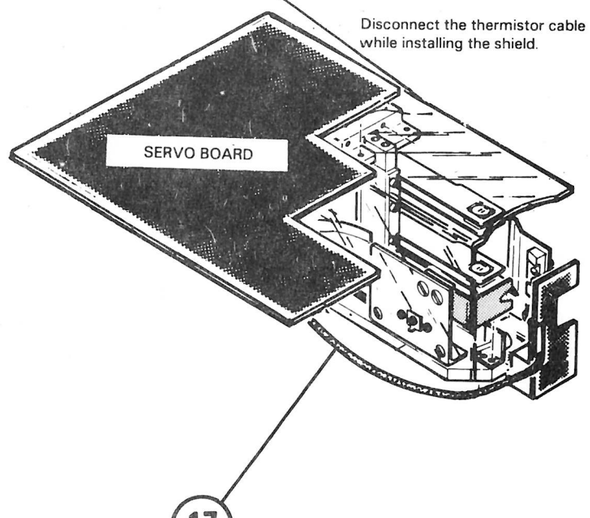
15 Unload the Heads and wait for the load light to turn on. Wait at least 2 sec after the load light has come on before removing the cartridge.
Remove all probes and jumpers used in this procedure.

Power off the drive.

16 Replace and secure shield.

NOTE:

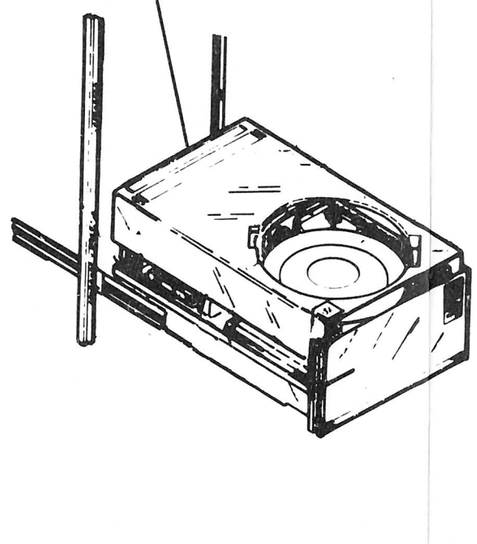
Disconnect the thermistor cable while installing the shield.



17 Reconnect the thermistor cable.

DG-03237

18 Replace the top cover of the drive.



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